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SETTLEABLE PARTICULATE  
MONITORED BY THE  
ONTARIO MINISTRY OF THE ENVIRONMENT  
IN THE  
COMMUNITY OF HEARST

JULY, 1977 TO DECEMBER, 1985

NER-AQTM-07-86



DECEMBER, 1986



Ontario

Ministry  
of the  
Environment

W.J. GIBSON, Director  
Northeastern Region

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Settleable Particulate Monitored by  
the Ontario Ministry of the Environment  
in the Community of Hearst

From July, 1977, to December, 1985

Prepared by:

D. J. Bazinet

NER-AQTM-07-86

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### Summary

The Ontario Ministry of the Environment has monitored settleable particulate in the community of Hearst since 1977, when dustfall jars were installed at the request of Abatement staff. Jars were added to the network in 1979 and 1984 to help isolate the contributions from the various wood products plants in the community. Microscopic examination of dustfall samples indicate that a large percentage of the particulate collected in Hearst is associated with the wood products industry.

Monitoring results indicate that, although abatement measures have been effective in reducing particulate emissions in some areas of the town, particulate levels (total dustfall) still exceed both the monthly and the yearly Provincial Criteria at some locations. The Ministry will continue to press the Companies to resolve this wood particulate emissions problem through improved wood materials handling and residue storage/disposal practices.

The Ministry will continue to monitor ambient particulate levels in the community to ensure continuity in the sampling program and to document changes in air quality as abatement programs continue. In addition, it is recommended that a research study be initiated to determine better ways of handling and storing wood products and woodwaste so as to reduce wind erosion of particulates from storage and waste piles which are often located adjacent to residential areas. The results of this study could then be used for approval purposes and lead to more effective abatement measures.

## Introduction

The Town of Hearst has, within its boundaries, two large sawmills, one plywood and one particleboard mill, and a woodwaste pelletizing plant. These industries are all located within a two kilometer radius.

The close proximity of Levesque Plywood Company Limited, Custom Sawmill Hearst Limited, United Sawmills Limited and Bioshell Hearst Limited to residential areas have, over the years, resulted in complaints of particulate fallout on private property to the Timmins District Office.

Because the particulate produced and emitted by the wood products industry consists of relatively large materials such as sawdust, small wood chips and wood char which settle out within a short distance from the source, monitoring is carried out using the dustfall jar technique.

In July, 1977, two dustfall jars (72017 and 72018) were installed in Hearst to monitor settleable particulate in the community; one of these (72017) was removed in August, 1983. Since that time, six additional jars have been added to the survey: two in March of 1979 (sites 72041 and 72042) and four in November of 1984 (sites 72080, 72081, 72082 and 72083). This report summarizes the data collected from July, 1977, to December, 1985.

### Sampling Techniques

As mentioned previously, dustfall sampling is used to monitor particulate in Hearst because of the nature of the emissions from the mills. A further discussion of the technique used for dustfall sampling is outlined in Appendix A. Samples collected in Hearst are examined to determine the composition of the particulate using an optical microscope in addition to the determination of total dustfall in grams/meters<sup>2</sup>/30 days (g/m<sup>2</sup>/30 d).

### Sampling Results

A summary of total dustfall data from July, 1977 to December, 1985 is presented in Table 1. Data collected at individual locations are presented in Tables 2 to 9 and in Figures 2 to 6. Locations of dustfall monitors are indicated in Figure 1.

Total dustfall levels regularly exceeded (44% of the samples collected) the monthly ambient air quality criterion of 7.0 g/m<sup>2</sup>/30 d as outlined in Ontario Regulation 296.

Generally, the numbers of exceedences of the monthly criterion reached a peak in 1979, decreased to a low in 1982, increased slightly thereafter and remained relatively constant through to 1985. The following table summarizes the

percentage of exceedences of the monthly criterion. Care must be taken when interpreting these results since the number of monitors varies from year to year.

Percentage of Exceedences of the Monthly Dustfall Criterion  
( $7.0 \text{ g/m}^2/30 \text{ d}$ ) in Hearst from 1977 to 1985

YEAR	1977	1978	1979	1980	1981	1982	1983	1984	1985
% of Exceedences	58	39	65	62	45	29	37	37	37

Station 72017 (Hwy. 11 and Tenth Street, Hearst) was installed in 1977 to monitor particulate from the United Sawmills operations, including a teepee burner, and showed a decrease in annual mean dustfall and numbers of exceedences of the monthly criterion after 1980. The reason for the sudden drop in the dustfall during 1978 is not obvious. The gradual decrease from 1979 can be attributed to the decrease in teepee burner activities and more woodwaste having been taken to the Bioshell plant.

Station 72018 (Second and Front Streets) was installed in 1977 to monitor the Levesque Plywood Company mill operations. Data from this location shows a decrease in the yearly mean after 1979, with another peak in 1983 and a substantial decrease in 1985. The number of exceedences of the monthly criterion were highest in 1979 and 1980, and remained relatively constant through 1985. The 1982 decrease can be attributed to the slowdown in production at the mill. The 1983 increase may be due to an increase in woodwaste

stockpiling as production resumed and the 1984-85 decrease reflects the abatement activities which resulted in a program approval and better housekeeping practices.

Station 72042 (George Street) was installed in 1979 to monitor the Levesque Plywood operations. Yearly mean dustfall levels decreased from a high of 9.5 in 1980 to below the yearly criterion in 1981, 1983, 1984 and 1985. Similarly, exceedences of the monthly criterion decreased in 1981 through to 1985. The higher mean yearly dustfall during 1980 may be due to the OMNI fuel gasification trials carried out that year.

Station 72041 (Custom Sawmill Road) was installed in 1979 to gather preoperational data and to monitor the Bioshell Hearst Limited operations which began in 1981. The yearly mean values have exceeded the Provincial Criterion each year and have shown an increase during 1983, 1984 and 1985. The decrease in 1982 reflects the slowdown in the wood products industry in Hearst during that year. The number of exceedences of the monthly criterion have remained relatively constant, with a maximum of six in 1981 and a minimum of three in 1979 and 1982. The fluctuation in total dustfall levels correspond with the operations at the Bioshell plant which experienced a slowdown in 1982.

Station 72080 (P. Leblanc, Custom Sawmill Road) was installed in late 1984 to try to further differentiate emissions from Bioshell Hearst Limited and the Levesque Plywood Company Limited operations at the Leblanc residence. The yearly mean criterion was exceeded at the site during 1985. Fifty percent of the samples collected during 1984 and 1985 were above the monthly Provincial Criterion.

Stations 72081 (Hwy. 11, east of General Tire), 72082 (Hwy. 11 at Hwy. 583) and 72083 (Tremblay Street, east of Quirion) were installed late in 1984 to determine the extent of particulate emissions from the Custom Sawmill and Levesque Plywood Limited facilities. The yearly mean criterion was exceeded at the two closer locations, 72081 and 72082, during 1985. The yearly mean criterion was not exceeded at 72083 during 1985.

The monthly criterion was exceeded a total of seven times at stations 72081 and 72082 during 1984 and 1985. It was not exceeded at 72083.

Examination of material using the optical microscope was carried out on approximately one-half of the samples collected. Results indicate that a large percentage of settleable particulate is of wood origin (wood fibres, wood char, wood material). Table 10 summarizes the percentage of total dustfall that consisted of wood material. The yearly

mean values ranged from 34% to 97% wood material, with a maximum value of 100% wood material. A comparison of total dustfall and percentage of wood material during snow cover and no snow cover periods is presented in Table 11. The percentage of wood material was greater at all locations during the snow cover period (October to April), when that portion of the total dustfall, which is normally attributed to dusting from vehicles both on and off-road and from wind erosion of soil is at a minimum. Total dustfall during the snow cover period has been typically one-half of the average no snow cover dustfall levels in areas where traffic volumes are heavy (Hwy. 11 and Tenth Street, Second and Front Streets, and Custom Sawmill Road).

#### Abatement Program and Strategy

Over the years, Timmins District Abatement staff have worked with the wood products industry to resolve environmental problems.

Custom Sawmill Hearst Limited ceased operation of a teepee burner in the late 1970's following complaints by local residents. Only one active teepee burner, owned by United Sawmills Limited, remains in Hearst. This unit was not operated in 1985.

As a result of surveys conducted by staff and engineering assessments made by the Approvals Section of the Ministry of the Environment in Toronto, environmental equipment installations, stack height modifications, and sawdust fuel boiler modifications have been performed at the Bioshell Hearst Limited plant and at the Levesque Plywood Company Limited particleboard mill. A program approval was negotiated with Levesque Plywood Company Limited, which involved the handling of particulate emitted from the mill.

In addition, wood handling and shavings stockpiling practices were discussed with all the mills in January of 1986 in light of new Ministry guidelines currently under preparation.

To remedy some of the particulate problems at the Levesque Plywood Company Limited mill, sawdust and waste are being transported to an MOE approved woodwaste disposal site outside the municipality. In conjunction with these improvements, a noise survey was conducted by District staff to determine what impact new equipment would have on residential areas in the vicinity of the mills.

Ongoing discussions with all the companies between 1982 and 1983 revealed that all shared woodwaste disposal problems. District staff conducted a survey of all operations in 1983 in an attempt to quantify the volumes of waste generated and to help the companies focus their attention on any impact these accumulations of wood residue were having on the local environment and area residents. Wood handling and residue



disposal practices were modified at some of the mills; however, woodwaste disposal remains a major problem. The Ministry will continue to press the companies to resolve this problem through improved wood materials handling and residue storage/disposal practices.

Although environmental improvements are continuing in the Town of Hearst, Custom Sawmill Hearst Limited was successfully charged under Section 13 of the Environmental Protection Act for an incident which occurred in February of 1985 with regard to particulate emissions in a nearby residential area.

#### Conclusions

The dustfall monitors installed in Hearst indicate that, since 1977, some of the localized air quality problems have been reduced through abatement measures such as shutdown of teepee burners, modifications to the process and better handling of woodwaste.

Although the monthly and yearly criteria continue to be exceeded at the majority of the locations, an overall lowering trend has been observed at some sampling sites, such as Second and Front Streets and George Street, near the Levesque plywood mill and the Custom Sawmill operations.

A major particulate problem continues to exist near the Bioshell Hearst Limited plant. Further work will be carried out at the Ministry of the Environment laboratories in Toronto to attempt to associate the types of particulate matter with the different sources in this area. This information should assist in the determination of the relative contributions from each of the major wood products industries to the particulate problem in Hearst and lead to further abatement action.

#### Recommendations

It is recommended that a dustfall monitoring network be maintained in Hearst to ensure continuity in the sampling program and to document changes in air quality. Consideration should also be given to the installation of a hi-vol sampler near site 72041 to determine the impact of suspended particulates on air quality due to emissions from Bioshell and Levesque Plywood Company Limited.

It is also recommended that a research study be initiated to determine better ways of handling and storing wood products and woodwaste so as to reduce wind erosion from storage and waste piles which are often located adjacent to residential areas.

TABLE 1

Annual Summary of Dustfall Data Collected in the Town of Hearst  
From July, 1977, to December, 1985

Location	Number of Samples Collected									Arithmetic Mean * (g/m <sup>2</sup> /30 days)								
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1977	1978	1979	1980	1981	1982	1983	1984	1985
Intersection Hwy. 11/10th St. (72017)	6	12	12	11	11	12	5	-	-	16.2	9.5	12.5	11.0	9.4	6.6	4.9	-	-
Second & Front Street (72018)	6	11	10	12	11	12	10	10	8	13.7	7.7	13.5	10.3	8.4	7.5	13.7	9.2	6.8
Custom Sawmill Road (72041)	-	-	10	11	11	12	10	11	9	-	-	5.7	7.5	8.9	5.2	10.8	8.6	11.7
George Street (72042)	-	-	9	11	11	12	10	11	9	-	-	8.6	9.5	4.3	5.7	3.8	3.5	3.8
P. Leblanc Custom Sawmill Rd. (72080)	-	-	-	-	-	-	-	2	9	-	-	-	-	-	-	-	N/A	9.1
East of General Tire and Hwy. 11 (72081)	-	-	-	-	-	-	-	2	9	-	-	-	-	-	-	-	N/A	5.1
Hwy. 11 at Hwy. 583 (72082)	-	-	-	-	-	-	-	2	9	-	-	-	-	-	-	-	N/A	6.3
Trembley St. East of Quirion (72083)	-	-	-	-	-	-	-	2	8	-	-	-	-	-	-	-	N/A	2.9
Total	12	23	41	45	44	48	35	40	61									

\* Annual Provincial Criterion - 4.5 g/m<sup>2</sup>/30 days

TABLE 1 (continued)

Location	Maximum Value (g/m <sup>2</sup> /30 days)									Number of Samples above Provincial Criterion *								
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1977	1978	1979	1980	1981	1982	1983	1984	1985
Intersection Hwy. 11/10th St. (72017)	35.5	21.3	29.9	22.7	19.9	15.2	6.9	-	-	4	5	8	8	7	5	0	-	-
Second & Front Street (72018)	30.1	15.5	19.8	22.0	16.4	19.4	27.4	16.0	12.8	3	4	10	10	5	5	8	7	5
Custom Sawmill Road (72041)	-	-	9.0	15.9	16.5	9.8	27.3	22.6	26.7	-	-	3	5	6	3	5	5	2
George Street (72042)	-	-	14.4	19.3	7.1	33.2	5.5	8.3	9.5	-	-	6	5	2	1	0	1	4
P. Leblanc Custom Sawmill Rd. (72080)	-	-	-	-	-	-	-	19.9	18.4	-	-	-	-	-	-	-	1	5
East of General Tire and Hwy. 11 (72081)	-	-	-	-	-	-	-	6.3	8.2	-	-	-	-	-	-	-	0	3
Hwy. 11 at Hwy. 583 (72082)	-	-	-	-	-	-	-	7.7	11.6	-	-	-	-	-	-	-	1	4
Trembley St. East of Quirion (72083)	-	-	-	-	-	-	-	3.7	5.2	-	-	-	-	-	-	-	0	0
Total										7	9	27	28	20	14	13	15	23

- Indicates missing or invalid data

\* Provincial Criterion - 7.0 g/m<sup>2</sup>/30 days (monthly)

TABLE 2

Summary of Monthly Dustfall Data Collected at Station 72017  
 Intersection Highway 11/10th Street in Hearst  
 From July, 1977, to July, 1983  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1977	-	-	-	-	-	-	<u>27.5</u>	<u>35.5</u>	<u>14.6</u>	5.8	<u>9.0</u>	4.7	16.2
1978	1.6	2.3	6.4	0.5	<u>17.0</u>	<u>16.4</u>	<u>17.9</u>	5.1	<u>15.4</u>	<u>21.3</u>	5.0	5.3	<u>9.5</u>
1979	4.6	4.8	<u>9.2</u>	<u>19.0</u>	<u>26.8</u>	<u>29.9</u>	<u>9.0</u>	<u>15.4</u>	<u>12.3</u>	5.7	5.7	<u>7.3</u>	<u>12.5</u>
1980	<u>7.9</u>	-	3.3	<u>8.5</u>	<u>22.7</u>	<u>16.8</u>	<u>16.8</u>	<u>17.6</u>	<u>11.1</u>	<u>11.1</u>	3.8	1.1	<u>11.0</u>
1981	0.4	2.6	-	<u>18.8</u>	<u>19.9</u>	<u>13.3</u>	<u>8.4</u>	<u>11.8</u>	<u>8.9</u>	<u>11.1</u>	6.9	1.3	<u>9.4</u>
1982	3.6	1.0	5.8	<u>15.2</u>	<u>11.1</u>	3.1	<u>9.0</u>	1.5	<u>9.8</u>	<u>13.6</u>	3.4	2.1	<u>6.6</u>
1983	1.4	-	-	5.3	6.9	6.3	4.4	Station Discontinued					4.9

- Indicates missing or invalid data

Underlined values exceed the Provincial Criteria 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)

TABLE 3

Summary of Monthly Dustfall Data Collected at Station 72018  
 Second and Front Streets in Hearst  
 From July, 1977 to June, 1986  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1977	-	-	-	-	-	-	<u>20.1</u>	<u>30.1</u>	<u>18.5</u>	4.6	5.3	3.8	13.7
1978	<u>10.4</u>	5.7	6.4	0.1	<u>15.5</u>	<u>14.1</u>	-	6.0	<u>8.0</u>	6.5	6.7	5.6	<u>7.7</u>
1979	<u>8.1</u>	<u>16.4</u>	<u>8.4</u>	<u>10.7</u>	<u>17.6</u>	<u>15.8</u>	<u>14.2</u>	<u>16.7</u>	<u>19.8</u>	-	-	<u>7.4</u>	<u>13.5</u>
1980	<u>13.4</u>	3.7	<u>11.1</u>	<u>9.2</u>	<u>12.3</u>	<u>13.4</u>	<u>13.4</u>	<u>22.0</u>	<u>8.3</u>	<u>8.3</u>	<u>7.4</u>	1.5	<u>10.3</u>
1981	5.9	5.9	-	<u>12.4</u>	<u>16.4</u>	<u>10.6</u>	<u>13.2</u>	6.5	5.8	<u>11.1</u>	2.5	1.7	<u>8.4</u>
1982	6.9	2.8	5.3	<u>8.4</u>	<u>8.2</u>	<u>10.7</u>	<u>19.4</u>	6.4	<u>8.5</u>	5.7	3.7	3.7	<u>7.5</u>
1983	3.3	-	<u>12.0</u>	<u>19.2</u>	<u>14.5</u>	<u>17.1</u>	<u>11.1</u>	<u>27.4</u>	<u>12.6</u>	<u>16.6</u>	3.6	-	<u>13.7</u>
1984	<u>12.3</u>	4.0	4.9	<u>13.1</u>	<u>7.7</u>	<u>11.2</u>	-	<u>16.0</u>	-	<u>8.5</u>	<u>10.1</u>	<u>4.5</u>	<u>9.2</u>
1985	3.4	2.1	<u>8.5</u>	<u>8.5</u>	<u>12.8</u>	-	<u>7.2</u>	-	<u>9.8</u>	-	2.2	-	<u>6.8</u>

- Indicates missing or invalid data

Underlined values exceed the Provincial Criteria 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)

TABLE 4

Summary of Monthly Dustfall Data Collected at Station 72041  
 Custom Sawmill Road in Hearst  
 From March, 1979, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1979	-	-	4.7	4.0	5.9	<u>9.0</u>	2.1	3.4	<u>8.2</u>	5.5	5.5	<u>8.2</u>	<u>5.7</u>
1980	5.6	4.4	5.5	4.6	<u>7.9</u>	-	<u>14.2</u>	<u>15.9</u>	<u>7.9</u>	<u>7.9</u>	6.2	2.2	<u>7.5</u>
1981	3.9	<u>9.3</u>	-	<u>9.2</u>	<u>16.5</u>	<u>11.6</u>	<u>13.3</u>	<u>16.3</u>	<u>6.0</u>	5.1	5.4	1.4	<u>8.9</u>
1982	5.8	3.8	7.0	5.4	<u>9.8</u>	<u>9.2</u>	6.8	5.6	3.7	2.0	1.8	1.7	<u>5.2</u>
1983	1.7	-	5.0	<u>12.8</u>	<u>7.2</u>	<u>20.6</u>	5.3	<u>27.3</u>	<u>18.3</u>	6.0	4.2	-	<u>10.8</u>
1984	6.1	5.1	2.7	4.7	<u>7.9</u>	5.9	<u>13.3</u>	<u>22.6</u>	-	<u>8.3</u>	<u>14.2</u>	3.7	<u>8.6</u>
1985	4.4	1.3	<u>26.1</u>	<u>13.0</u>	<u>26.7</u>	-	4.5	<u>24.6</u>	2.9	-	1.7	-	<u>11.7</u>

- Indicates missing or invalid data

Underlined values exceed the Provincial Criteria 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)

TABLE 5

Summary of Monthly Dustfall Data Collected at Station 72042  
 George Street in Hearst  
 From April, 1979, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1979	-	-	-	<u>11.8</u>	6.6	<u>14.4</u>	6.6	<u>9.4</u>	<u>7.9</u>	<u>8.8</u>	<u>8.8</u>	2.9	8.6
1980	<u>16.3</u>	5.7	<u>9.1</u>	<u>19.3</u>	6.3	-	<u>9.8</u>	<u>14.9</u>	6.0	6.0	6.6	5.0	<u>9.5</u>
1981	0.6	6.5	-	4.6	6.6	<u>7.1</u>	6.1	<u>7.1</u>	3.0	3.5	1.5	1.2	4.3
1982	2.6	1.8	2.5	<u>33.2</u>	5.6	2.7	4.2	2.6	2.4	3.4	1.7	5.5	<u>5.7</u>
1983	5.5	-	3.2	3.4	4.3	3.2	3.0	5.0	4.1	4.0	1.9	-	3.8
1984	2.6	1.2	1.7	4.5	4.1	3.6	<u>8.3</u>	3.7	-	3.2	3.4	1.9	3.5
1985	1.6	1.2	4.0	2.5	<u>7.4</u>	-	<u>9.5</u>	4.3	2.9	-	0.8	-	3.8

- Indicates missing or invalid data

Underlined values exceed the Provincial Criterion 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)



TABLE 6

Summary of Monthly Dustfall Data Collected at Station 72080  
 P. Leblanc Custom Sawmill Road in Hearst  
 From November, 1984, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1984	Station began operation in November, 1984										<u>19.9</u>	6.6	13.3
1985	<u>8.0</u>	3.6	<u>18.4</u>	3.0	<u>9.1</u>	-	5.5	<u>17.6</u>	<u>15.3</u>	-	1.1	-	<u>9.1</u>

TABLE 7

Summary of Monthly Dustfall Data Collected at Station 72081  
 East of General Tire and Highway 11 in Hearst  
 From November, 1984, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1984	Station began operation in November, 1984										6.3	3.0	4.7
1985	3.2	3.8	5.5	3.8	<u>8.2</u>	-	<u>7.1</u>	<u>8.2</u>	4.7	-	1.1	-	<u>5.1</u>

- Indicates missing or invalid data

Underlined values exceed the Provincial Criteria 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)

TABLE 8

Summary of Monthly Dustfall Data Collected at Station 72082  
 Highway 11 at Highway 583 in Hearst  
 From November, 1984, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1984	Station began operation in November, 1984										<u>7.7</u>	4.2	6.0
1985	3.8	2.5	<u>7.2</u>	6.1	<u>11.6</u>	-	5.6	<u>10.5</u>	<u>8.4</u>	-	0.8	-	<u>6.3</u>

TABLE 9

Summary of Monthly Dustfall Data Collected at Station 72083  
 Trembley Street East of Quirion in Hearst  
 From November, 1984, to December, 1985  
 (g/m<sup>2</sup>/30 days)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1984	Station began operation in November, 1984										3.7	1.3	2.5
1985	4.0	0.7	3.7	1.3	1.2	-	5.2	-	4.6	-	3.0	-	2.9

- Indicates missing or invalid data

Underlined values exceed the Provincial Criteria 7.0 g/m<sup>2</sup>/30 days (monthly)  
 4.5 g/m<sup>2</sup>/30 days (annual mean)

TABLE 10

Summary of Examination by Optical Microscopy  
of Dustfall Samples Collected in Hearst  
From 1979 to 1985

Sampling Location	Year	Number of Samples Examined	Percent Consisting of Wood Material	
			Mean	Maximum
Intersection Highway 11/10th Street 72017	1979	5	69	94
	1980	3	70	98
	1981	3	43	99
	1982	5	34	84
Second and Front Streets 72018	1979	6	70	95
	1980	4	92	98
	1981	3	97	99
	1982	6	81	100
	1983	6	91	100
	1984	6	89	100
Custom Sawmill Road 72041	1985	5	78	100
	1979	6	87	95
	1980	4	89	99
	1981	7	80	100
	1982	6	81	99
	1983	6	96	99
	1984	6	84	100
George Street 72042	1985	6	92	100
	1979	5	82	94
	1980	6	87	99
	1981	7	82	100
	1982	6	82	99
	1983	6	97	99
	1984	6	84	99
	1985	7	87	100

TABLE 11

Comparison of Total Dustfall and Percentage of Wood Material  
During Periods of Snow and No-snow Cover in Hearst  
From 1977 to 1985

Sampling Location	Year	% Wood Origin		Total Dustfall	
		Snow	No Snow	Snow	No Snow
Intersection Highway 11/10th Street 72017	1977	-	-	6.5	25.9
	1978	-	-	6.1	14.4
	1979	82	60	8.0	18.9
	1980	89	32	5.9	17.0
	1981	55	21	6.9	12.5
	1982	41	6	6.4	6.9
	1983	-	-	3.4	5.9
Mean		67	30	6.2	14.5
Second and Front Streets 72018	1977	-	-	4.6	22.9
	1978	-	-	5.9	10.9
	1979	89	60	10.2	16.8
	1980	93	91	7.8	13.9
	1981	97	96	6.6	10.5
	1982	97	49	5.2	10.6
	1983	99	75	10.9	16.5
	1984	89	90	8.2	11.6
	1985	84	64	4.9	9.9
Mean		91	75	7.0	13.7
Custom Sawmill Road 72041	1979	87	88	5.6	5.7
	1980	99	80	5.2	11.5
	1981	95	61	5.7	12.7
	1982	97	49	3.9	7.0
	1983	97	94	5.9	15.7
	1984	92	69	6.4	12.4
	1985	87	100	9.3	14.7
Mean		92	77	5.7	12.5
George Street 72042	1979	89	78	8.1	9.0
	1980	89	86	9.7	9.3
	1981	94	68	2.5	6.0
	1982	98	52	7.2	3.5
	1983	98	95	3.6	3.9
	1984	98	57	2.6	4.9
	1985	100	78	2.0	6.0
Mean		96	73	4.6	5.7

Snow cover period October to April

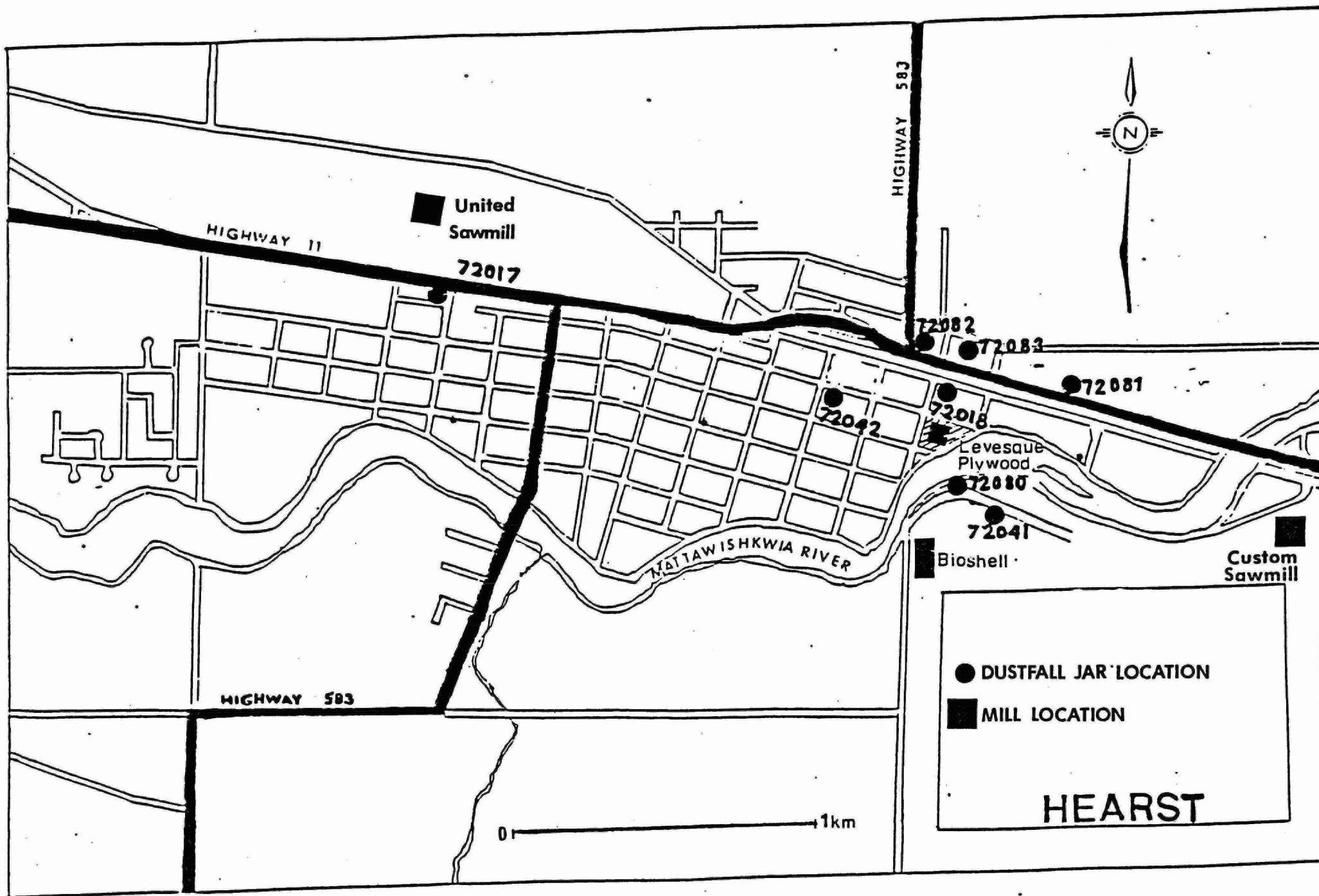


Figure 1

ANNUAL MEAN DUSTFALL LEVELS COLLECTED AT  
INTERSECTION HWY. 11/10th ST., STATION 72017  
HEARST FROM JULY, 1977 TO JULY, 1983

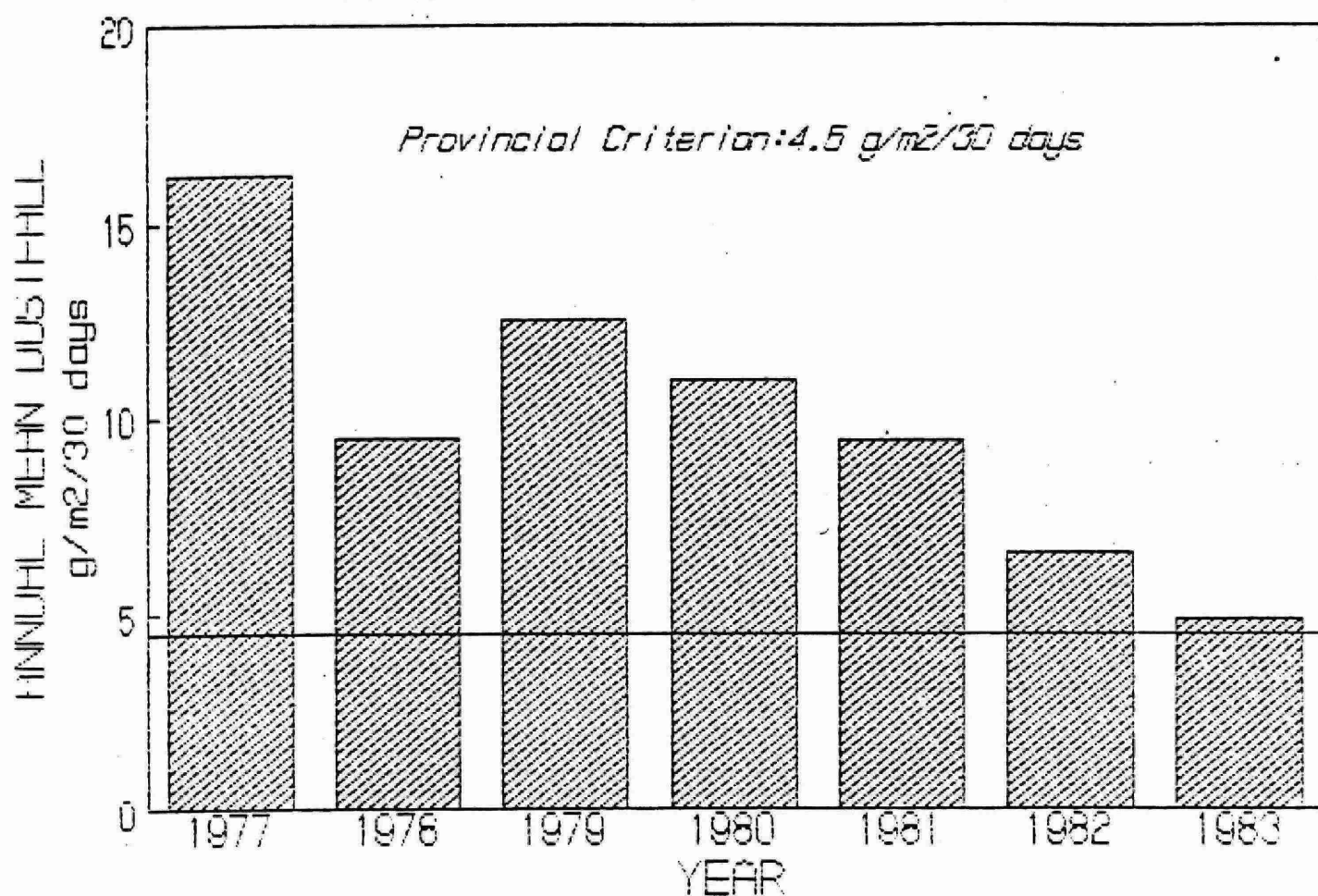


Figure 2

ANNUAL MEAN DUSTFALL LEVELS COLLECTED AT  
SECOND AND FRONT STREET, STATION 72018  
HEARST FROM JULY, 1977 TO DECEMBER, 1985

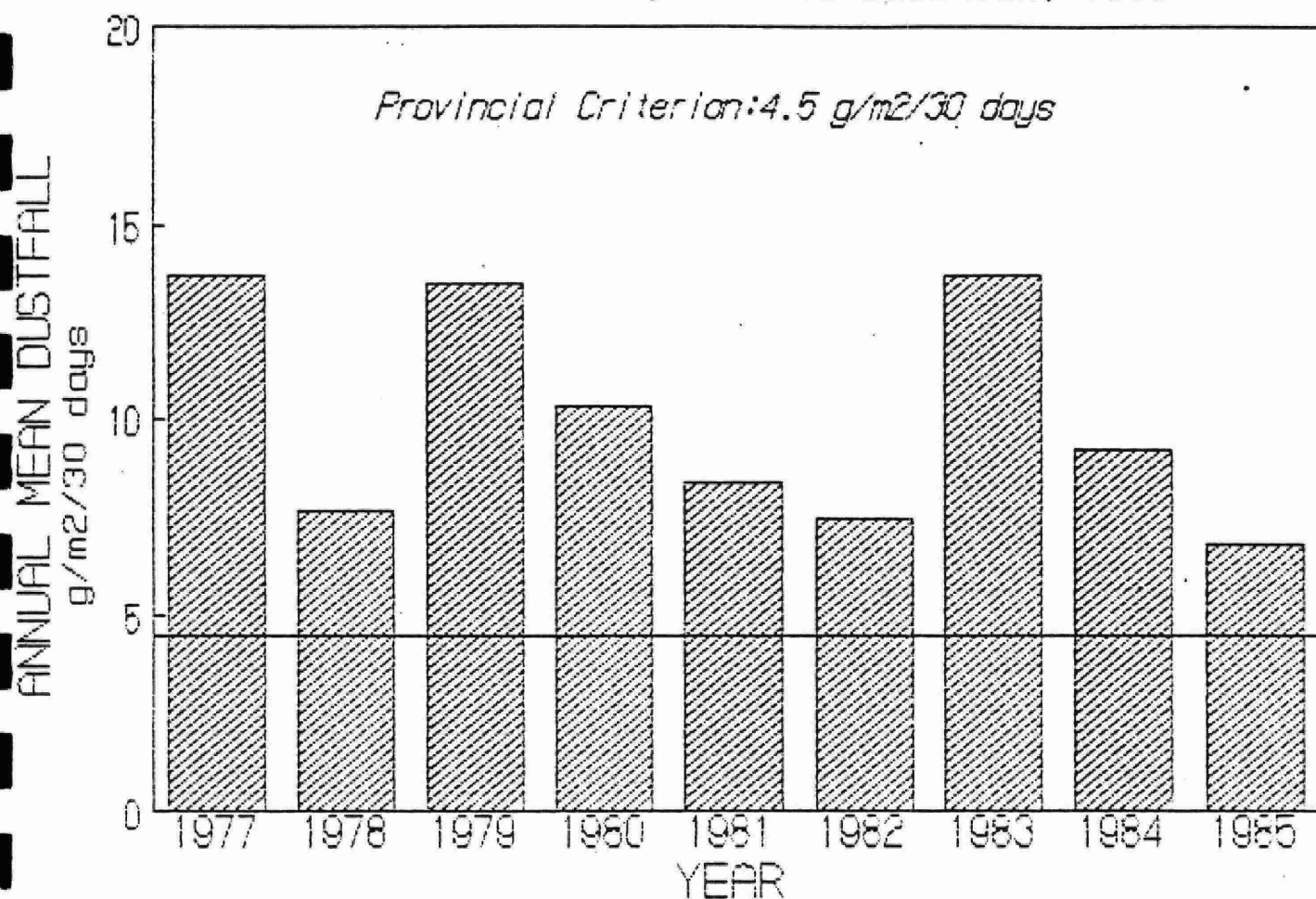


Figure 3

ANNUAL MEAN DUSTFALL LEVELS COLLECTED AT  
GEORGE STREET, STATION 72042 HEARST  
FROM APRIL, 1979 TO DECEMBER, 1985

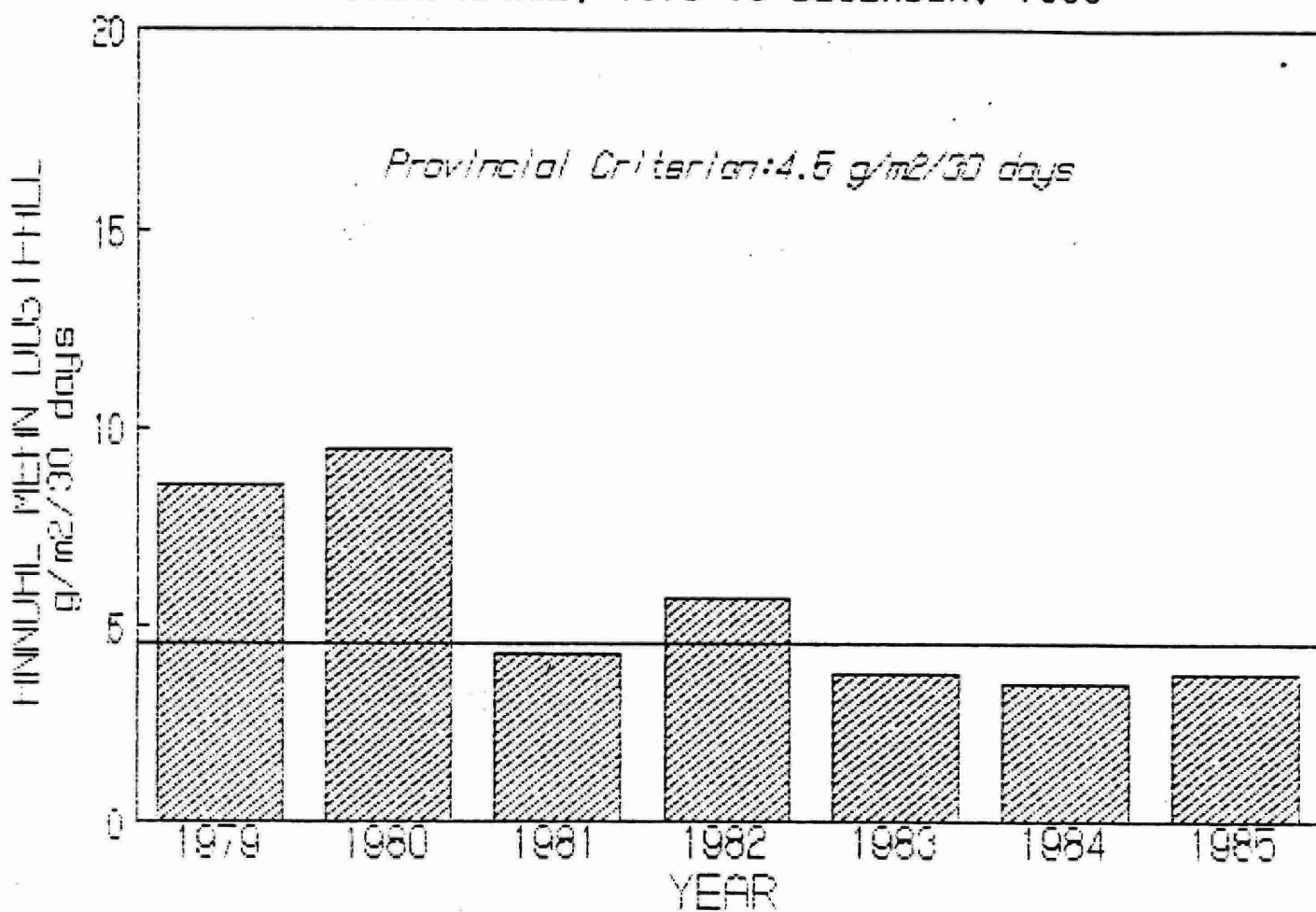


Figure 4



ANNUAL MEAN DUSTFALL LEVELS COLLECTED AT  
CUSTOM SAWMILL RD., STATION 72041 HEARST  
FROM MARCH, 1979 TO DECEMBER, 1985

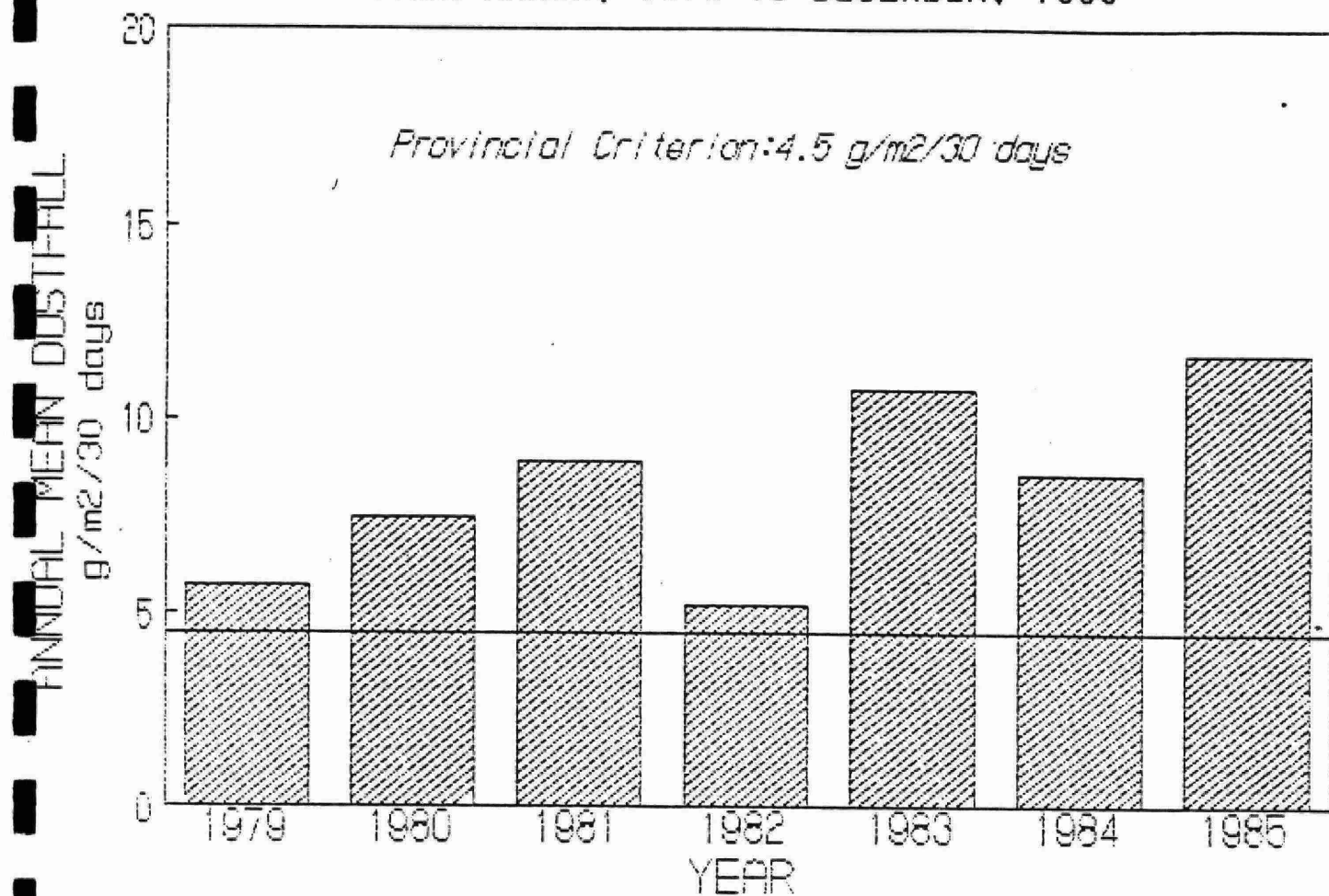


Figure 5

# ANNUAL MEAN DUSTFALL LEVELS

COLLECTED FOR 1985 AT HEARST  
STATION # 72080, 72081, 72082, 72083

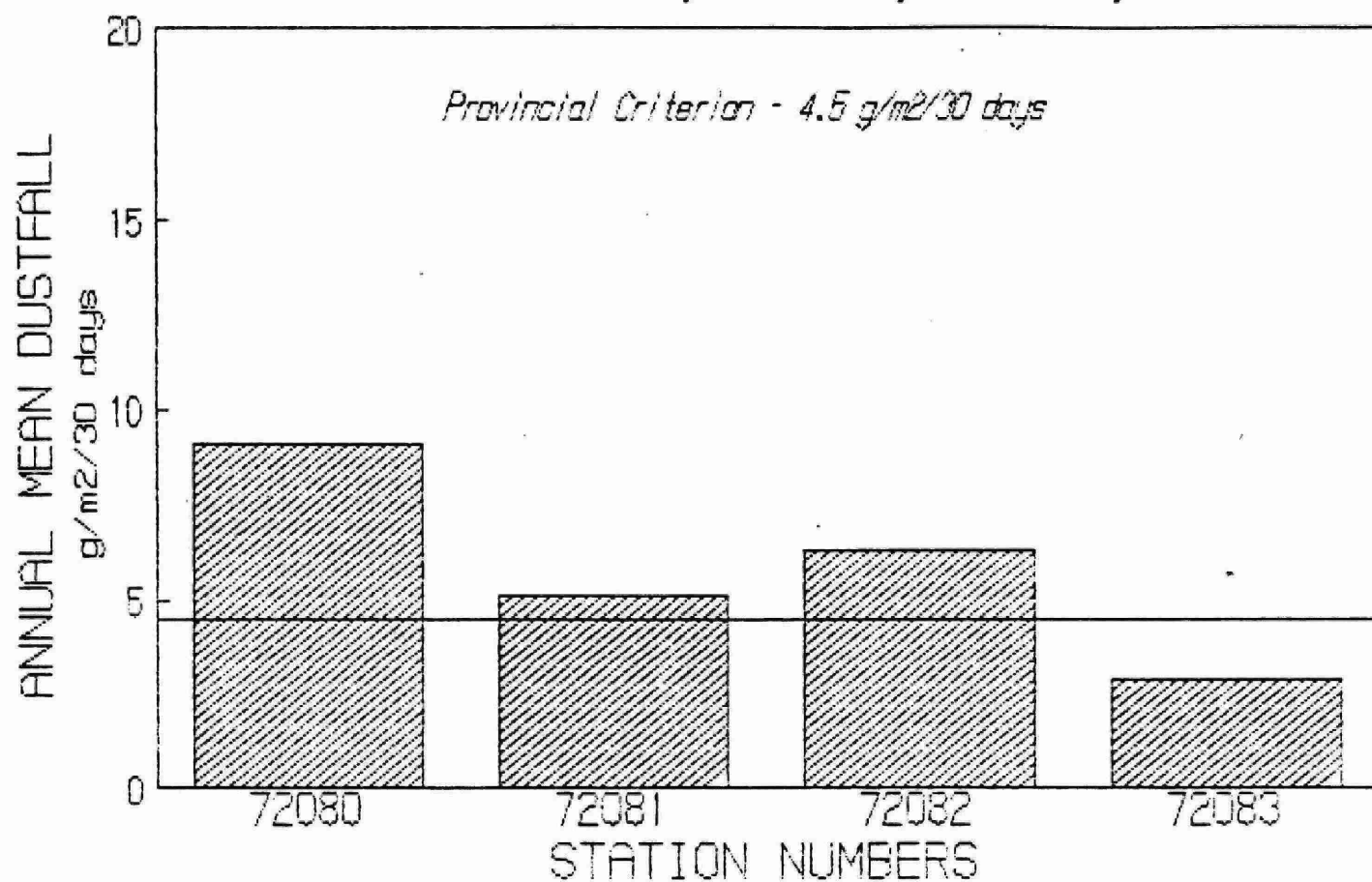


Figure 6

## APPENDIX

### Dustfall Monitoring

Dustfall (total) comprises of larger, more visible, particulate matter which settles out from the atmosphere by gravity. It is measured by exposing an open top plastic jar for approximately 30 days.

The total amount of dustfall is determined by weighing the contents of the jar and expressing the results in  $\text{g/m}^2/30$  days.

The settleable particulate collected in the dustfall jar can be separated into a soluble and an insoluble fraction for further analysis. The insoluble portion can be examined using an optical microscope to determine the composition of the particulate.

Although this method of sampling can be variable and is dependant on external factors such as wind and the amount of rain and/or snowfall during the sampling period, it is very useful in determining the amount of settleable particulate in the atmosphere.



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